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large, the obtuse bracts spatulate or lanceolate, entire, serrulate or dentate, 2-4 times the length of the head (in one case 5 cm. long); corolla 4 mm. long, mostly 4-lobed, pale greenish-yellow, narrowly funnellform, tapering gradually to the base; stamens and style included; achenes rather large (body 7-9 mm. long by 3 mm. broad), evenly cuneate, very flat, scarcely carinate, glabrous and smooth except the margin on which the retrorse hairs extend to the base, dark greenish-yellow and often minutely dark dotted, flat or convex at the summit; awns commonly three (two long and one shorter), long, straight and stout ($\frac{1}{3}$ - $\frac{3}{4}$ length of achene), equaling or longer than the corolla.

Eastern States, westward to Illinois.

The stem and more slender branches of *B. connata* are purplish, leaves more slenderly petioled, often 3-parted, more acuminate and darker green; heads smaller, bracts of the involucre fewer, twice the length of the heads or less, narrower; corolla deep orange yellow, abruptly contracted below the middle and commonly 5-cleft; stamens often exserted; achenes smaller, darker, often strongly carinate, commonly hairy and tuberculate, margins with mixed upwardly and downwardly directed or entirely erect hairs; awns 2-4, shorter ($\frac{1}{4}$ - $\frac{1}{2}$ length of achene).

CORNELL UNIVERSITY.

Shrubs and Trees of the Southern States.—II.

BY JOHN K. SMALL.

I. NEW AND NOTEWORTHY SPECIES.

TSUGA CAROLINIANA Engelm. Coult. Bot. Gaz. 6: 223. 1881.

Last fall I received specimens of this very ornamental hemlock from two new localities in North Carolina. Mr. A. M. Huger found groves of it at Banner's Elk, Watauga County, at an elevation of 1300 meters and in the Linville Gorge, Burke County, at about 575 meters above sea-level, the latter station, together with that at Tallulah Falls, Georgia, and the New River, Virginia, representing the lowest altitudes at which the species has been found.

HICORIA GLABRA (Mill.) Britton, Bull. Torr. Club, 15: 284. 1888.

Among the many unique things that Stone Mountain affords are some dwarf hickory trees, usually less than two meters in height, bearing quite an abundance of fruit.

QUERCUS MINIMA (Sarg.)

Quercus virens var. *dentata* Chapm. Fl. S. States, 421. 1860.
Not *Q. dentata* Bartr. 1794.

Quercus Virginiana var. *minima* Sarg. Silva N. A. 8: 101. 1895.

A low shrub forming wide patches by the extensive spreading of the underground stems. Branches erect or ascending, less than 1 meter tall, solitary or several together, simple, or branched above; leaves firm, obovate or sometimes oblong to oblanceolate, 3-10 cm. long, acute or apiculate at the apex, repand-serrate, or the upper ones sometimes entire, those of the shoots often lobed, all glabrous or finely tomentose beneath, gradually or abruptly narrowed into short petioles which vary from 2-5 mm. in length; staminate aments very slender, 1-4 cm. long, tomentose; acorns solitary or several at the ends of peduncles which vary from 1-3 cm. in length, or sometimes sessile; cups turbinate-hemispheric, about 1.5 cm. broad, white-tomentose, the bracts appressed, thickened on the back, except near its edge where they form a fringe; nuts ovoid or elliptic, 1.5-1.8 cm. long, dark brown, glabrous.

Sandy sterile pine barrens, Florida, chiefly near the coast. Flowers in March and April; matures its fruit in the fall.

This peculiar oak cannot pose as a variety of *Quercus Virginiana* under any reasonable considerations. It may be of interest to note that it bears much the same relation to *Quercus Virginiana* as *Castanea nana* does to *Castanea pumila* or *Castanea dentata*. The habit of *Quercus minima*, with its underground stems, and low erect branches which are usually much less than one meter in height, is enough to separate it specifically from the gigantic forest tree *Quercus Virginiana*. In addition to the differences in habit just mentioned, the leaf types are characteristic and the nerves in the leaves of *Quercus minima* are much more prominent than they are in the live oak. The cups seem to furnish a diagnostic character, those of the *Quercus minima* being of a turbinate type, while those of *Quercus Virginiana* are hemispheric.

QUERCUS GEMINATA n. sp.

A shrub or small tree, 2-5 meters tall, with a maximum trunk diameter of about 15 cm. Leaves narrowly oblong, elliptic, or oblong-oblanceolate, 3-6 cm. long, entire, obtuse or apiculate, strongly revolute, mostly gradually narrowed at the base, glabrous and parchment-like above, finely tomentose and conspicuously rugose by the prominent nerves beneath; petioles 2-6 mm.

long; flowers not seen; acorns usually 2 at the end of a peduncle, which varies from 1-4 cm. in length; cups turbinate, 1 cm. broad, tomentose, the bracts appressed, slightly thickened near the base of the cup, fringed at the edge; nuts ovoid or narrowly oval, 1-1.7 cm. long, twice or thrice as long as the cups.

Sandy soil, chiefly in the scrub, Florida. Flowers in spring and matures its fruit in the fall.

Mr. Nash, who collected and observed this plant during the seasons of 1894 and 1895, assures me that it is perfectly distinct from its relatives. This is doubtless a fact, and both the foliage and fruit furnish excellent characters. The very prominently rugose lower leaf-surfaces and the strongly revolute leaf-margins have no parallel in *Quercus Virginiana*. The acorns are always borne in pairs at the ends of short stout peduncles; the turbinate cups with their constricted bases are diagnostic.

CELTIS GEORGIANA n. sp.

A diffuse shrub with slender often 2-ranked branches, the leafy twigs more or less pubescent. Leaves ovate, 2-5 cm. long, averaging 2.5 cm. in length, or those on vigorous shoots sometimes 6 cm. long, acute, entire or sharply serrate above the middle, inequilateral, rounded or truncate at the oblique base, dark green, scabrous and occasionally sparingly pubescent above, paler and glabrous beneath, except for a few hairs on the nerves; petioles 1.5-4 mm. long, pubescent; pedicels usually slightly curved, 1.5-4 mm. long, pubescent; drupes subglobose, sometimes broader than long, 6-7 mm. in diameter, tan-color, smooth and glabrous, or sometimes glaucous; seeds obovoid-globose.

Along or near streams, north-central Georgia. Flowers in the spring; matures its fruit in September.

Collected by the writer, first in the Yellow River Valley, near McGuire's Mill, Gwinnette County, in 1893, and in succeeding years at many points about Stone Mountain and the contiguous region.

A low species related to *Celtis pumila*, from which it may be distinguished by its smaller merely acute leaves, the very short pedicels and the smaller tan-colored drupes.

CELTIS HELLERI n. sp.

A much branched, wide spreading tree, sometimes 10 meters tall with a maximum trunk diameter of 1.5 meters. Bark of the

trunk and main branches with numerous corky warts; leaves rather firm, the blades ovate to oblong, 4-7 cm. long, obtuse or acute, crenate-serrate, especially above the middle, rounded or subcordate at the base, deep-green and scabrous-pubescent above, pale and tomentose beneath, slightly inequilateral, oblique at the base; petioles stout, 3-4 mm. long, tomentose; pedicels sparingly pubescent, curved, 1-1.5 cm. long; drupe subglobose, 7-9 mm. in diameter, light-brown, translucent, smooth and shining; seeds globose, strongly 4-ribbed, prominently reticulated.

In dry ground near San Antonio, Texas.

A rather low tree with a short stout trunk varying from .5-1.5 meters in diameter, and a wide spreading top. The branches are numerous and bulky. The original specimens were gathered by Mr. Heller from trees growing in a strip of woodland between the city of San Antonio and the San Antonio River, Texas, no. 1587.

TOXYLON POMIFERUM Raf. Am. Month. Mag. 2: 118. 1817.

Years ago the osage orange was planted on Paris Mountain, South Carolina, for hedges and for ornamental purposes. For many years the settlements have been neglected and deserted and the tree has spread and established itself in an astonishing manner, now appearing as if indigenous.

ALBIZZIA JULIBRISSIN Durazz. Mag. Tosc. 3: 11. 1772.

Although not indigenous, this tree now appears as if it were native in the southern states. It grows along roadsides and here and there through the pine woods much as the honey locust (*Gleditsia triacanthos*) does in many localities. It ranges from North Carolina to Georgia, Florida and Alabama, where Prof. Underwood collected specimens during the past summer. It is quite abundant in southern Georgia.

AMORPHA VIRGATA Small, Bull. Torr. Club, 21: 17. *pl.* 171. 1894.

In the spring of 1896 Dr. Charles Mohr sent me a specimen of *Amorpha virgata* from the mountains of Madison county, Alabama, thus extending the known geographic range of the species from Stone Mountain, Georgia, to northern Alabama. Dr. Mohr gives the altitude of this locality as 350 meters. While collecting at different points along the eastern section of the Blue Ridge dur-

ing the summer of 1896, I was surprised to find the species both on the slopes and summit of Paris Mountain near Greenville, and on the slopes of Table Mountain. At the former locality it occurred at an altitude of about 500 metres, and on Table Mountain it ranged from 800-900 meters. Its characters hold perfectly.

LONICERA FLAVA Sims. Bot. Mag., *pl.* 1318. 1810.

About two years ago I recorded* several new localities for this handsome honeysuckle. Further exploration of the southern end of the Blue Ridge has revealed additional stations. In the summer of 1894 I found some bushes on the upper slopes of Currahee Mountain, an isolated peak near Toccoa, Georgia, and a little later noticed several bushes on Stone Mountain. During the past summer I collected it on Paris Mountain, South Carolina, the original locality, where it grows at several points along the rocky summit, and later discovered a new station on the precipitous cliffs of Table Mountain, in the same state. At the latter place the shrubs were more robust and vigorous than at any of the other stations.

The finest flowering specimens I have ever seen were sent me by Mr. A. M. Huger, who secured them on Tyron Mountain, Polk County, North Carolina, last spring. Mr. Huger's discovery extends the range of the species into another state, but although we now have specimens showing the species to range from North Carolina to Georgia, it is not common at any of the localities, a few bushes only existing at the different places.

II. THE GENUS GAYLUSSACIA IN THE SOUTHERN STATES.

During several seasons I have had ample opportunity to study this imperfectly understood group in the field and have made observations on all except one of the species recognized in the appended revision. As far as I can see, the forms hitherto considered as varieties of other species are abundantly distinct and should be treated as species. Mr. Nash came to the same conclusion during his field-work in Florida. The diagnostic characters are brought out in the following key and descriptions.

* Bull. Torr. Club, 21: 305.

Corolla campanulate or globose campanulate; leaves destitute of sticky resin.

Stems horizontal, underground, the branches erect.

Pubescence consisting of gland-tipped hairs.

Twigs and racemes pilose.

1. *G. dumosa*.

Twigs and racemes bristly-hispid.

2. *G. hirtella*.

Pubescence consisting of simple non-glandular hairs.

Leaves glaucous, glabrous or nearly so.

3. *G. nana*.

Leaves densely tomentose, especially beneath.

4. *G. tomentosa*.

Stems erect, the branches spreading.

Leaves leathery, obtuse or retuse; drupe glaucous.

5. *G. frondosa*.

Leaves thin, acuminate and apiculate; drupe black.

6. *G. ursina*.

Corolla conic; leaves sticky with a resinous secretion.

7. *G. resinosa*.

1. GAYLUSSACIA DUMOSA (Andr.) T. & G.

Vaccinium dumosum Andr. Bot. Rep. 8: 112. 1794.

Gaylussacia dumosa T. & G.; A. Gray, Man. 259. 1848.

A low shrub, 1–5 dm. tall, with underground stems and erect solitary or tufted branches; the twigs, leaves and inflorescence glandular-pilose. Leaves leathery, the blades oval, obovate or oblanceolate, rarely linear-oblanceolate, 2–4 cm. long, apiculate at the apex, ciliate, short-petioled, deep green above, paler beneath; calyx glandular, about 5 mm. broad, the segments triangular or triangular ovate, acute, about as long as the tube; corolla campanulate, 5–6 mm. long, white or pink, wax-like, the segments broadly ovate, more or less recurved and revolute; filaments short, pubescent; anthers longer than the filaments, prolonged into filiform tubes; drupe globose, black, 6–8 mm. in diameter, commonly somewhat pubescent.

In sandy soil, Newfoundland and along the coast to New York, south to eastern Pennsylvania, North Carolina, Florida and Louisiana. Spring; matures its fruit in the summer.

2. GAYLUSSACIA HIRTELLA (Ait.) Klotzsch.

Vaccinium hirtellum Ait. Hort. Kew. Ed. 2. 2: 357. 1811.

Gaylussacia hirtella Klotzsch, Linnaea, 14: 48. 1840.

Gaylussacia dumosa var. *hirtella* A. Gray, Man. 259. 1848.

A shrub, with underground stems, the branches, twigs and inflorescence bristly-hispid, the tips of the hairs with minute glands; leaves firm, the blades oblanceolate-spatulate or elliptic, 3–6 cm. long, apiculate, glandular-ciliate sparingly hispid above, short-petioled; racemes many-flowered; calyx hispid, 6 mm. broad, the segments triangular, rather acuminate, about as long as the tube; corolla broadly campanulate, 7–8 mm. long, the segments broader than long, the tips recurved, the edges revolute; filaments short,

pubescent; anthers longer than the filaments, prolonged into fili-form tubes; drupe not seen.

In sand, Florida to Louisiana. Spring; fruit ripe in the summer.

Certainly distinct from *Gaylussacia dumosa*, from which it differs in habit, size and leaf characters. The pubescence is always diagnostic, the corolla is larger and much thinner than that of *G. dumosa*, while the calyx-segments are longer and usually acuminate.

3. GAYLUSSACIA NANA (A. Gray).

Gaylussacia frondosa var. *nana* A. Gray, Syn. Fl. N. A. Ed. 2. 2: Pt. 1, 396. 1886.

A low glaucous shrub 1-4 dm. tall, spreading by underground stems. Leaves leathery, the blades elliptic, obovate or nearly spatulate, 2-3 cm. long, obtuse or minutely apiculate at the apex, glaucous on both sides, becoming bright green above, prominently rugose and sprinkled with amber-colored resin beneath, short-petioled; racemes few-flowered; pedicels slender, puberulent when young; calyx glabrous, 3 mm. broad, the segments triangular, acute, about as long as the tube; corolla globose-campanulate, 3 mm. long, the segments ovate, acutish, longer than broad; filaments short, glabrous; anthers longer than the filaments, prolonged into slender tubes; drupes subglobose, 6-7 mm. in diameter, rather dry, glaucous.

In sandy pine barrens, Georgia to Florida and Alabama. March to April; matures its fruit in the summer.

Easily distinguished from *Gaylussacia frondosa*, with which it has been associated, by its very glaucous foliage and strongly rugose and much smaller leaves, besides its peculiar underground stems.

4. GAYLUSSACIA TOMENTOSA Pursh.

Gaylussacia frondosa var. *tomentosa* A. Gray. Syn. Fl. N. A. 2: Pt. 1, 19. 1878.

Gaylussacia tomentosa Pursh; A. Gray. Syn. Fl. N. A. 2: Pt. 1, 19. As synonym. 1878.

A low shrub, spreading by underground stems, the foliage tomentose with brownish hairs. Leaves leathery, the blades oblong or elliptic, often slightly broadest above the middle, 2.5-7 cm. long, obtuse and apiculate at the apex or sometimes notched, brown-tomentose on both sides, densely so beneath, short-petioled;

racemes few-flowered; pedicels 1–1.5 cm. long, much longer than the bracts; calyx glabrous, about 3.5 mm. broad, the segments ovate, acute, about as long as the tube; corolla campanulate, 3.5 mm. long, the segments ovate, obtuse, about as long as broad, the tips recurved, the edges revolute; filaments dilated, glabrous; anthers longer than the filaments, prolonged into slender tubes; drupes depressed-globose, 8–9 mm. in diameter, glaucous.

In sandy soil, Georgia and Florida. Spring; matures its fruit in the summer.

Like the preceding species, *Gaylussacia tomentosa* has underground stems, but it differs from it in the brown-tomentose foliage, more robust habit, larger leaves and different leaf-form. The fruit of *G. tomentosa* is larger and much more fleshy than that of *G. nana*.

5. GAYLUSSACIA FRONDOSA (L.) T. & G.

Vaccinium frondosum L. Sp. Pl. 351. 1753.

Gaylussacia frondosa T. & G.; Torr. Fl. N. Y., 1: 449. 1843.

An irregularly branched shrub 1–2 meters tall, with puberulent twigs and young leaves. Leaves firm, the blades oblong-oblan-ceolate, ovate, oval or obovate, obtuse or notched at the apex, delicately revolute, short-petioled, bright green and glabrate above, glaucous and sprinkled with minute golden globules of resin beneath; racemes loose; pedicels long and slender; calyx glabrous, 3–4 cm. broad, the segments triangular, acute or acutish, about as long as the tube; corolla globose-campanulate, about 4 mm. long, green to purplish, the segments triangular, broader than long, recurved and revolute; filaments dilated, glabrous; anthers longer than the filaments, prolonged into slender tubes; drupe globose, 8–10 mm. in diameter, with a pale bloom.

In sandy soil, New Hampshire, south to Florida, Kentucky and Louisiana. Spring; matures its fruit in the summer.

6. GAYLUSSACIA URSINA (M. A. Curtis) T. & G.

Vaccinium ursinum M. A. Curtis, Am. Journ. Sci. 44: 82. 1843.

Gaylussacia ursina T. & G.; A. Gray, Mem. Am. Acad. (II.) 3: 49. 1846.

A straggling branching shrub, 6–15 dm. tall, with sparingly pubescent twigs and young foliage. Leaves thin, the blades oblong, elliptic or oblanceolate, usually rhomboidal, 4–10 cm. long, usually short-acuminate; apiculate, ciliate, deep green above, paler beneath, pubescent on the nerves on both sides, obtuse or rounded at the base, short-petioled; flowers few, in lateral somewhat drooping racemes; calyx with numerous golden glands, about 3 mm.

broad, its 5 segments very low, obtuse, several times shorter than the tube; corolla globose-campanulate, greenish-white or tawny-red, about 4-5 mm. long, its segments triangular, acutish, recurved, revolute; filaments dilated, pubescent, incurved at the apex, longer than the anthers which have short tubes at the apex; drupe globose, 10-12 mm. in diameter, black, shining, sweet.

In deep forests on the mountains, North Carolina to northern Georgia. Spring; matures its fruit in the late summer.

7. *GAYLUSSACIA RESINOSA* (Ait.) T. & G.

Vaccinium resinosum Ait. Hort. Kew. 2: 12. 1789.

Gaylussacia resinosa T. & G.; Torr. Fl. N. Y. 1: 449. 1843.

A rigid branching shrub 3-12 dm. tall, its twigs and foliage more or less pubescent and sticky with a resinous secretion when young, leaves firm, the blades elliptic, oval or oblong, sometimes broadest above the middle, firm, obtuse or apiculate, entire, ciliate, short petioled; flowers in lateral drooping racemes; pedicels 2-8 mm. long, usually with two narrow bracts; calyx about 2 mm. broad, its 5 segments ovate, obtuse, about as long as the tube; corolla obconic, red or reddish-green, 5-6 mm. long, more or less constricted near the apex, the segments ovate, spreading or recurved, revolute, obtuse; filaments winged, pubescent, shorter than the anthers, each cavity of which is prolonged into a tube; drupes globose, 6-10 mm. in diameter, black or rarely white, sweet.

In rocky woods and hillsides, Newfoundland to the Saskatchewan, south to Georgia. Spring; matures its fruit in the summer.

New Species of Lichens from Southern California as determined by
Dr. W. Nylander and the late Dr. Stizenberger.

BY H. E. HASSE.

PARMELIA SUBOLIVACEA Nyl.

Thallus similar to *P. olivacea* (L.) Ach., but differing in size of spores, these being 8-9 by 5 mic., and also in the spermatia.

On rocks, San Gabriel Mountains at 1500 meters alt. July, 1894.

HEPPIA TERRENA Nyl.

Thallus monophyllous, round, olive green, with repand border; apothecia single in the fronds, circular, depressed, dull red; spores colorless, globular, 4 mic. in diameter.